National Institute of Environmental Health Sciences

Japanese encephalitis risk and contextual risk factors in Southwest China: A Bayesian hierarchical spatial and spatiotemporal analysis

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Abstract:

It is valuable to study the spatiotemporal pattern of Japanese encephalitis (JE) and its association with the contextual risk factors in southwest China, which is the most endemic area in China. Using data from 2004 to 2009, we applied GISmapping and spatial autocorrelation analysis to analyze reported incidence data of JE in 438 counties in southwest China, finding that JE cases were not randomly distributed, and a Bayesian hierarchical spatiotemporal model identified the east part of southwest China as a high risk area. Meanwhile, the Bayesian hierarchical spatial model in 2006 demonstrated a statistically significant association between JE and the agricultural and climatic variables, including the proportion of rural population, the pig-to-human ratio, the monthly precipitation and the monthly mean minimum and maximum temperatures. Particular emphasis was placed on the time-lagged effect for climatic factors. The regression method and the Spearman correlation analysis both identified a two-month lag for the precipitation, while the regression method found a one-month lag for temperature. The results show that the high risk area in the east part of southwest China may be connected to the agricultural and climatic factors. The routine surveillance and the allocation of health resources should be given more attention in this area. Moreover, the meteorological variables might be considered as possible predictors of JE in southwest China.

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Resource Description

Communication: ☑

resource focus on research or methods on how to communicate or frame issues on climate change; surveys of attitudes, knowledge, beliefs about climate change

A focus of content

Communication Audience: ☑

audience to whom the resource is directed

Health Professional

Early Warning System: ☑

resource focus on systems used to warn populations of high temperatures, extreme weather, or other elements of climate change to prevent harm to health

A focus of content

Exposure : ☑

weather or climate related pathway by which climate change affects health

Ecosystem Changes, Precipitation, Temperature

Geographic Feature: ☑

resource focuses on specific type of geography

Rural

Geographic Location: ☑

resource focuses on specific location

Non-United States

Non-United States: Asia

Asian Region/Country: China

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Vectorborne Disease

Vectorborne Disease: Mosquito-borne Disease

Mosquito-borne Disease: Viral Encephalitis

Medical Community Engagement: ☑

resource focus on how the medical community discusses or acts to address health impacts of climate change

A focus of content

Mitigation/Adaptation: ☑

mitigation or adaptation strategy is a focus of resource

Adaptation

Population of Concern: A focus of content

Population of Concern: ☑

populations at particular risk or vulnerability to climate change impacts

Children

Resource Type: ☑

format or standard characteristic of resource

Research Article

Timescale: ☒

time period studied

Time Scale Unspecified

Vulnerability/Impact Assessment: ☒

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content